

Communicable Disease Report

Hawai'i Department of Health
Communicable Disease Division

September/October 1999

Murine Typhus on Kaua'i: 1998

Introduction

Murine typhus is a zoonotic disease caused by *Rickettsia typhi*. Commensal rats of the genus *Rattus* are the primary reservoirs of *R. typhi*. The oriental rat flea, *Xenopsylla cheopis*, is the principal vector, but the cat flea (*Ctenocephalides felis*) has been found to be naturally infected with *R. typhi*. The disease has been successfully controlled in the United States through insect and rodent control strategies. The reported annual incidence has dropped from more than 5000 cases in the 1940s to fewer than 100 in the 1980s.¹

Murine typhus was very common in Hawai'i during World War II, but its incidence dropped dramatically at the end of the war, which coincided with widespread use of the pesticide Dichloro-Diphenyl-Trichloroethane (DDT) in rodent burrows. A hyperendemic focus of the disease has persisted in the Kihei area of Maui, where most recent cases have been reported. From 1994 through 1998, physicians and laboratories reported 27 cases to the Department of Health (DOH); 20 were from Maui, two from O'ahu and five from Kaua'i. All of the cases from Kaua'i occurred in 1998. The last previously reported case from Kaua'i was in 1982.

Murine typhus often presents with the triad of headache, fever and rash one to

two weeks after exposure to infective fleas of rats, mice, cats or other small mammals. Transmission typically occurs after contamination of the flea bite site or other skin wound with flea feces infected with rickettsia. Infection may also result from inhalation of dried flea feces.²

Laboratory confirmation of infection requires either a four-fold rise in antibody titer to typhus group antigens as detected by the Indirect Fluorescent Antibody (IFA) test in specimens taken two weeks apart, or a single titer of 1:128 by an IgM IFA test. The five Kaua'i cases reported in 1998 represent the highest annual incidence on the island since the 1940s. The following is a summary of the cases.

Case Reports

Case #1. In April, a 42 year-old female Kekaha resident suffered onset of fever to 104°F, chills, headache, myalgia, erythema around the face and eyes, macular rash on the trunk and arms, arthralgia, and nausea. She was hospitalized for 5 days for suspected leptospirosis, meningitis or Rocky Mountain spotted fever. Paired serum samples were negative by the Indirect Hemagglutination Assay screening test for leptospirosis. Weil-Felix testing on serum obtained two days after her onset was positive by the Proteus OX-19 and

OX-K screening tests. A convalescent IgG and IgM IFA titer drawn 18 days after onset was 1:256 for typhus group antigen. The patient cleaned an old shed with rodent harborage at her home two weeks prior to the onset of her illness, and reported a flea infestation in her home during that time. No rodent trapping or testing was done. The patient recovered from her illness.

Case #2. In August, a 33 year-old Makaweli resident presented with fever, chills, headache, myalgia, arthralgia, abdominal pain, vomiting, cough and photophobia. He did not have a rash. The physician suspected leptospirosis or viral illness. The patient was not hospitalized. He was ill for 5 weeks before recovery. Serum samples were negative for leptospirosis. A convalescent IFA titer for typhus group antigen drawn 68 days after onset demonstrated an IgG titer of 1:256 and an IgM titer of 1:128. The man worked as a sugar plantation irrigator, and lived in a plantation camp in a house located between two vacant houses. A week before his illness, he used rodenticides and flea sprays at home because of rodent and flea infestations. He also reported the death of two puppies at that time. The DOH Vector Control staff trapped rodents at the residence in November. Two of three rats were positive for *R. typhi*.

continued on page 6

Tuberculin Skin Testing for School Entry in Hawai'i

The State of Hawai'i requires that children be tested for tuberculosis (TB) before first entering pre-school, before first entering K-12 school and before first entering post-secondary schools (technical, secretarial, colleges, universities). A valid TB clearance issued within 12 months before first entry into a K-12 school or post-secondary school in Hawai'i shall not expire for purposes of K-12 school or post-secondary school attendance and may be used for entry or transfer into all K-12 schools or post-secondary schools in Hawai'i. A negative tuberculin test or a negative chest x-ray will be accepted as evidence of freedom from communicable TB.

The Mantoux Skin Test

The Mantoux tuberculin skin test is the standard method of identifying individuals infected with *Mycobacterium tuberculosis*. Multiple puncture or tine tests are unreliable, and not acceptable for TB clearance purposes.

The Mantoux test is performed by the intradermal injection of 0.1 milliliter of purified protein derivative (PPD) tuberculin containing five tuberculin units (TU) into either the volar or dorsal surface of the forearm. Either Aplisol or Tubersol are acceptable commercial brands of PPD solution. The injection should be made with a disposable tuberculin syringe, just

beneath the surface of the skin, with the needle bevel facing upward. This should produce a discrete, pale elevation of the skin (a wheal) six millimeters to 10 millimeters in diameter.

Universal precautions for infection control should be maintained, and in order to prevent needle stick injuries, needles should not be recapped, bent or removed from the syringes. After they are used, they should be placed in designated puncture-resistant containers for disposal.

The reaction to the Mantoux test should be read by a trained health care worker 48 to 72 hours after the injection. The area of induration (palpable swelling) around the site of injection is the reaction to tuberculin. The diameter of the indurated area should be measured across the forearm (perpendicular to the long axis). Erythema (redness) should not be measured. Cross-wise parameters (i.e. such readings as 10 millimeters by 13 millimeters) are also **not** appropriate. All reactions should be recorded in millimeters of induration even if negative. If no induration is found, "0 mm" or "zero millimeters" should be recorded.

If the patient does not show up for reading within the 48 to 72 hours time period, a positive skin test may be measurable up

to one week after testing. However, if the person who fails to return in time for a scheduled reading has a negative test, the tuberculin test must be repeated.

Positive Test Results in High Risk Individuals

A tuberculin reaction of five millimeters or more induration is considered positive in certain high-risk individuals:

- those known to have or suspected of having HIV infection;
- close contacts to a person with infectious TB;
- persons who have chest x-ray findings suggestive of previous TB who have received inadequate or no treatment; and
- intravenous drug users whose HIV status is unknown.

Otherwise, the State of Hawaii TB Administrative Rules (§11-164-2) defines a positive tuberculin reaction as 10 millimeters or greater of palpable induration in its transverse diameter.

False Positive and False Negative Reactions

The tuberculin test reaction can be affected by various factors producing potentially false-positive or false-negative results.

False positive PPD reactions can be caused by:

- previous vaccination with BCG (Bacille Calmette-Guerin), or
- infection with non-tuberculous mycobacteria.

False negative tuberculin skin test reactions may be seen with:

- recent administration of live-virus vaccines;
- the combination MMR (Measles, Mumps, Rubella) vaccine may be administered simultaneously with the tuberculin skin test. Otherwise, tuberculin skin testing should be delayed for 4-6 weeks after MMR vaccination to minimize the risk of a false-negative tuberculin skin test interpretation;
- cutaneous anergy from HIV infection;
- overwhelming TB disease;
- severe or febrile illness;
- measles or other viral infections;
- Hodgkin's disease;
- other malignancies;
- sarcoidosis;

continued on page 7

Communicable Disease Report

Communicable Disease Division	586-4580
Epidemiology Branch	586-4586
Tuberculosis Disease Control Branch	832-5731
Hansen's Disease Control Branch	735-2472
STD/AIDS Prevention Branch	733-9010
STD Reporting	733-9289
AIDS Reporting	733-9010
Information & Disease Reporting	586-4586
After-hours Emergency Reporting	247-2191 (State Operator)
After-hours Neighbor Island Emergency Reporting	800-479-8092



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Diagnostic Tests for Hepatitis C Virus

Hepatitis C Virus (HCV) infection became reportable to the Department of Health in October, 1997. Since then, more than 3800 positive laboratory and physician reports have been received. Early diagnostic testing is important because 75-85% of the individuals infected with HCV become chronic carriers.

Antibody Tests

Analogous to HIV testing, the preliminary anti-HCV antibody screening test performed for HCV infection is an Enzyme Linked Immuno-sorbent Assay (ELISA) test. This test is FDA approved and is readily available. Although the sensitivity and specificity of these ELISA tests may be greater than 97%, the predictive value of a positive test in a low incidence population may only be 10%. Confirmatory testing of repeatedly reactive ELISA tests should be performed, using either the Recombinant Immunoblot Assay (RIBA) which identifies anti-HCV antibodies, or a Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) assay for HCV RNA which detects the virus.

RIBA is a supplemental assay for anti-HCV antibody that increases the specificity of the diagnosis. Immunoblot assays are also called "Western blots." RIBA results are either positive, indeterminate, or negative. There is a strong correlation between RIBA reactivity and the presence of Hepatitis C viremia.

Detection of Hepatitis C Viremia

The RT-PCR assay for HCV RNA is the best approach to confirm the diagnosis of Hepatitis C Virus. The presence of HCV RNA in the serum indicates active infection. Low levels of viremia can be detected. This is the most specific test for the presence of infection. Both qualitative and quantitative assays are available, and the amount of virus detectable is different between tests. The threshold level for the quantitative tests is about 2000 genome copies per milliliter of whole

blood. The level of detection for the qualitative test is about 500 genome copies per milliliter of whole blood.

These tests are not FDA approved. The reliability and specificity of the RT-PCR techniques are not standardized, expensive, and prone to laboratory error. When ordering HCV RNA testing by PCR, the physician should use a high-quality laboratory willing to document standardization of the test.

Quantification of Hepatitis C viremia can be accomplished by quantitative PCR or by branched DNA (bDNA) enhanced signal amplification techniques. These methods are different, and provide different results on the same specimen. The HCV RNA levels are not comparable across the different assays. Serial measurements of viral load must be performed by the same technique. Viral load does not correlate with the severity of the hepatitis or with a poor prognosis, but does correlate with the likelihood of a response to antiviral therapy. Rates of response to combination antiviral therapy with alpha interferon and ribavirin are higher among patients with less than two million copies per milliliter of HCV RNA.

Genotyping of HCV

There are six known genotypes and more than 50 subtypes of hepatitis C. Knowing the genotype or serotype (genotype-specific antibodies) of HCV is often clinically helpful in making recommendations regarding therapy. Patients with genotypes 2 and 3 are more likely to respond to therapy with alpha interferon or the combination of alpha interferon and ribavirin. When using combination therapy, the recommended duration of treatment is 24 weeks for patients with genotypes 2 and 3, and 48 weeks for patients with genotype 1. Once the genotype is identified, a patient does not need to be tested again because genotypes will not change during the course of infection.² The genotyping of HCV is not al-

ways necessary in the management of chronic hepatitis C disease. Although persons with genotype 1 respond less often to treatment, the genotype should not be a deciding factor on whether to treat with antiviral therapy.

The Diagnostic Algorithm

The National Institutes of Health and the Centers for Disease Control have published guidelines on whom to test¹ for HCV and a testing algorithm for asymptomatic individuals (See Figure 1). Hepatitis C is most readily diagnosed when serum aminotransferases are elevated and anti-HCV antibody is present in serum. The diagnosis is confirmed by the finding of HCV RNA in serum.

An individual having a positive or repeatedly reactive ELISA for anti-HCV antibody should have a RT-PCR for HCV RNA or RIBA performed. If a patient is negative by RT-PCR, the RIBA confirmatory test for anti-HCV antibody should be ordered. This is because the RT-PCR only tests for the presence of the virus. Because some HCV infected individuals experience intermittent viremia, a negative RT-PCR test only means that the serum tested contains fewer genome copies than the RT-PCR test can detect, and not necessarily that the serum is devoid of virus. A RIBA test may confirm the antibodies detected in the ELISA assay are specific to HCV. A negative RIBA indicates that the antibodies are not specific and that a reactive screening ELISA test is a "false positive." Indeterminate RIBA results require additional medical and laboratory evaluation such as liver enzyme tests, and repeat RT-PCR tests.

A true positive anti-HCV antibody test does not distinguish between current active, recent, or past inactive infection, or recovery from infection. These antibody tests reflect the host immune response to the HCV infection but does not detect

continued on page 4

The TEEN VAX Project

The Hawai'i Immunization Program (HIP) has launched the new TEEN VAX Project, which runs from September 1, 1999 through August 31, 2000. Children aged 6 through 18 years old are eligible for free vaccines for varicella (chicken pox), measles-mumps-rubella (MMR), tetanus-diphtheria (Td), and hepatitis B.

TEEN VAX was created to eliminate cost as a barrier to immunization. The HIP is providing free vaccines to physicians

with the agreement that they not charge patients for these vaccines. Although an administration fee could be assessed, most health insurers have also agreed not to require the usual co-payment for the office visit.

Children beginning a vaccination series before August 31, 2000 will be permitted to complete the series with free vaccine according to the recommended schedule.

For further information about TEEN VAX, please contact the Vaccines for Children Program at (808) 586-8312 on Oahu or (800) 933-4832 on the neighbor islands.

Submitted by Judy Strait-Jones, M.P.H., M.Ed., Public Health Educator, and Tim Helton, M.S., M.P.H., Public Health Educator, Hawai'i Immunization Program, Epidemiology Branch.

Revised Recommendations for Routine Poliomyelitis Vaccination

Since 1979, the only indigenous cases of poliomyelitis reported in the United States (U.S.) have been associated with use of the live oral poliovirus vaccine (OPV). Until recently, the benefits of OPV use (i.e., intestinal immunity, secondary spread) outweighed the risk for vaccine-associated paralytic polio (VAPP) (one case per 2.4 million doses distributed). In 1997, in order to decrease the risk for VAPP while maintaining the benefits of OPV, the Advisory Committee on Immunization Practices (ACIP) recommended a sequential schedule of inactivated poliovirus vaccine (IPV) followed by OPV.

Since 1997, the global polio eradication initiative has progressed rapidly, and the likelihood of poliovirus importation into the U.S. has decreased substantially. In addition, no decline in polio vaccination coverage with the sequential schedule has been observed, despite the need for additional injections. On the basis of these data, in order to eliminate the risk for VAPP, the ACIP has recommended an all-IPV schedule for routine childhood polio vaccination in the U.S.¹ As of January 1, 2000, all children should receive

four doses of IPV at ages 2 months, 4 months, 6-18 months, and 4-6 years.

OPV should be used only for the following special circumstances:

1. Mass vaccination campaigns to control outbreaks of paralytic polio.
2. Unvaccinated children who will be traveling in <4 weeks to areas where polio is endemic.
3. Children of parents who do not accept the recommended number of vaccine injections. These children may receive OPV only for the third or fourth dose or both; in this situation, health-care providers should administer OPV only after discussing the risk for VAPP with parents or caregivers.

Future availability of OPV is expected to be limited in the U.S.

REFERENCE.

- ¹ Centers for Disease Control and Prevention. Recommendations of the Advisory Committee on Immunization Practices: Revised Recommendations for Routine Poliomyelitis Vaccination. *MMWR*, 1999;48(27):590.

Hepatitis C Virus

continued from page 3

viremia. In the presence of chronic liver disease, the presence of a positive anti-HCV test usually implies ongoing viral infection. An anti-HCV positive patient with normal liver enzyme levels and no clinical evidence of liver disease should have a HCV RNA determination to document HCV infection. Those individuals who are anti-HCV antibody positive but HCV RNA negative may have recovered from the infection, but you still can not exclude undetected viremia, and false positive ELISA reactivity.

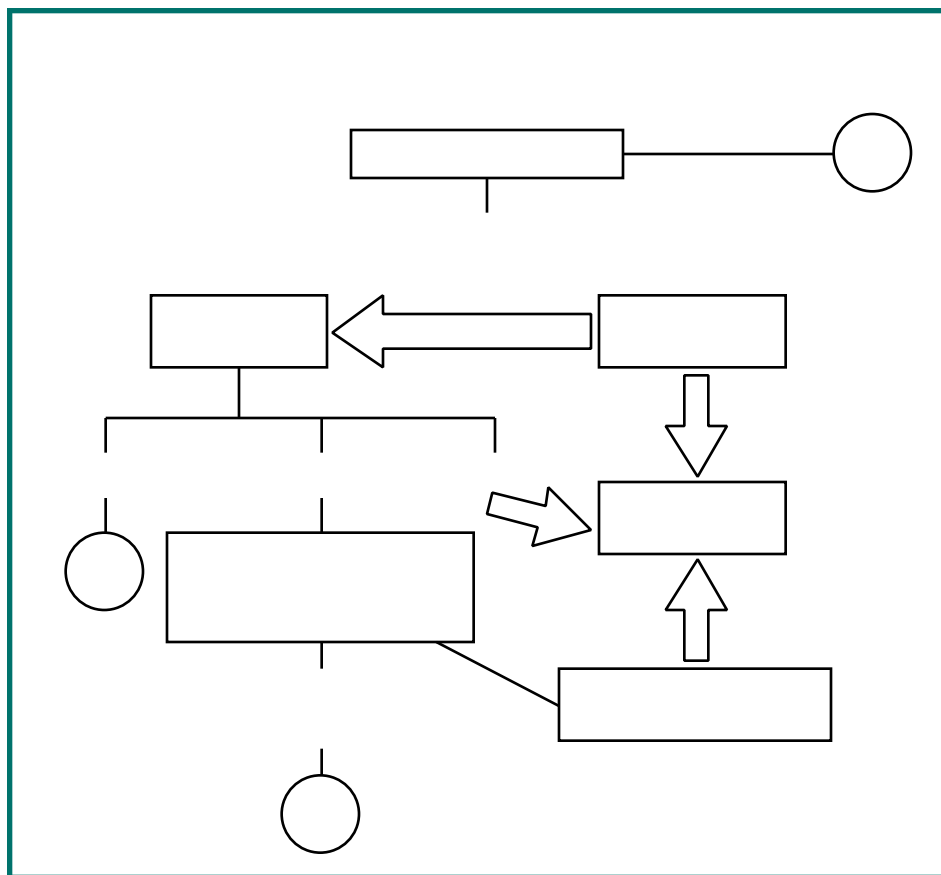
Acute and Chronic Hepatitis C
Hepatitis C infection is often asymptomatic. Acute Hepatitis C is diagnosed clinically when a person presents with the typical manifestations of acute hepatitis (jaundice, malaise, anorexia, right upper quadrant abdominal pain), elevated serum aminotransferases, and the presence of anti-HCV antibody. Anti-HCV antibody is not always present when the patient presents with symptoms. It may take 10 weeks or more from the time of infection to develop detectable antibodies to HCV. With a high index of suspicion that an individual was infected, it may be more appropriate to test by RT-PCR which can detect HCV and its genotypes in the blood 1-3 weeks after exposure.

continued on page 5

Hepatitis C Virus

continued from page 4

Chronic hepatitis C is diagnosed when anti-HCV is present and serum aminotransferase levels remain elevated for more than 6 months. Testing for HCV RNA by RT-PCR confirms the diagnosis and documents that viremia is present. Almost all patients with chronic infection will have the viral genome detectable in serum by PCR. Diagnosis is problematic in patients who cannot produce anti-HCV antibodies because of immunodeficiency. Thus, HCV RNA may be required for patients who have a solid organ transplant, are on dialysis, are taking corticosteroids, or have agammaglobulinemia. Other forms of chronic liver disease can sometimes produce a false-positive ELISA anti-HCV antibody test. Performance of RT-PCR in these circumstances can help exclude HCV infection, or confirm coexistent HCV infection contributing to the liver problem.



Who Should Be Tested?

The following information on persons for whom testing for HCV is recommended was extracted from the *MMWR, Recommendations and Reports*, Vol. 47, No. RR-19.¹

Testing should be offered routinely to persons most likely to be infected with HCV who might require medical management. The testing should be accompanied by appropriate counseling and medical follow-up. In addition, anyone who wishes to know or is concerned regarding their HCV-infection status should be provided the opportunity for counseling, testing, and appropriate follow-up.

Persons who should be tested routinely for HCV infection based on their risk for infection include:

- persons who ever injected illegal drugs, even those who injected once or only a few times many years ago and do not consider themselves as drug users;
- persons who received clotting factor concentrates produced before 1987;

- persons who were ever on chronic hemodialysis;
- persons with evidence of chronic liver disease or persistently elevated alanine aminotransferase levels;
- prior recipients of blood transfusions or organ transplants before July, 1992 when better testing of blood and organ donors for HCV became available; and
- persons who were notified that they received blood from a donor who later tested positive for HCV infection.

Persons who should be tested routinely for HCV-infection based on a recognized exposure include healthcare, emergency medical, and public safety workers after needle sticks, sharps, or mucosal exposures to HCV-positive blood, and children born to HCV-positive women.

Please refer to "Hepatitis C: A Reportable Disease" in the March/April 1999 issue of the *Communicable Disease Report* for additional information on HCV infection, or call the Hepatitis Control Section in Honolulu at (808) 586-8324.

EDITORIAL NOTE: Appreciation is extended to Mary Glover, M.D., who called for clarification of the diagnosis of Hepatitis C after reading "Hepatitis C: A Reportable Disease" in the March/April 1999 issue of the *Communicable Disease Report*. This article was written in response to her inquiry.

REFERENCES:

- ¹ Centers for Disease Control and Prevention, Recommendations for Prevention and Control of Hepatitis C Virus (HCV) Infection and HCV-Related Disease. *MMWR* 1998;47(RR-19):20-27.
- ² National Institutes of Health. Chronic Hepatitis C: Current Disease Management, NIH Publication No. 99-4230, 1999. It is accessible on the internet at <http://www.niddk.nih.gov/health/digest/pubs/chrnhepc/chrnhepc.htm>.
- ³ Gordon SC, Schiff ER: Hepatitis C. In *Current Practice of Medicine*. 1999, 2:19-26. (An excellent clinical review article on Hepatitis C Virus).

Submitted by Joe L. Elm, M.S., Epidemiological Specialist, Hepatitis Control Section, Epidemiology Branch.

Murine Typhus on Kauai

continued from page 1

Case #3. An 80 year-old Waimea resident was hospitalized for 6 days in October 1998 with fever to 103°F, chills, headache, myalgia, abdominal pain and coughing. He did not have a rash. The initial diagnosis was sepsis of unknown etiology. He was tested for leptospirosis and typhus. Leptospirosis serology was negative. A typhus IFA IgG titer obtained six days after onset of illness was 1:64. The patient recovered. The convalescent typhus IFA IgG titer drawn 46 days after onset was >1:256. The man frequently slept outside on a cot in the yard at a Waimea residence. He saw rats in the trees and had daily contact with the family dogs in the yard. One of three rats trapped at the residence in early December by DOH staff was positive for *R. typhi*.

Case #4. Three weeks after the onset of Case 3, a 42 year-old Waimea neighbor was hospitalized for four days with similar symptoms, but had a macular blanching rash distributed over the trunk and arms. Leptospirosis and typhus were suspected. The acute typhus IFA IgG titer drawn six days after onset of illness was 1:64. The man recovered. A convalescent IFA titer drawn 17 days after onset was 1:256 for typhus IgG antibodies. Every two weeks, the man sprayed an insecticide around the house for dog flea control. He reported no flea infestation or rodent sightings. One of two rats trapped at his residence in early December was positive for *R. typhi*. This patient also had positive acute and convalescent microscopic agglutination test (MAT) titers of 1:800 for *Leptospira interrogans* serogroup Australis.

Case #5. On December 31, 1998 a 56 year-old male Kekaha resident had onset of fever, chills, headache, myalgia, and cough. He had no rash. He was hospitalized for 7 days with a diagnosis of pneumonia and abnormal liver function tests. Leptospirosis and rickettsial diseases were suspected. The Weil-Felix agglutination screening test on a sample obtained nine days after onset of illness was

positive with a 1:160 titer Proteus OX-19 agglutination reaction. Blood drawn 41 days after onset showed a 1:256 titer for IFA typhus IgM and IgG antibodies. Serologic tests were also positive for leptospirosis. The acute MAT titer for *L. interrogans* serogroup Australis six days after onset was 1:200. The convalescent MAT titer for *L. interrogans* serogroup Australis 41 days after onset was 1:400. The man adopted a stray kitten infested with fleas in December. No rodent trapping was done.

Discussion

Southwestern Kaua'i has emerged as an endemic site for human murine typhus cases in Hawai'i. All of the 1998 cases lived on the dry southwest coast of the island, where climatic conditions are similar to the endemic area of typhus on Maui. All reported either flea or animal exposure. Two of the cases also had evidence of leptospirosis infection. Rodents are the most common sources for both infections.

The Kaua'i DOH Vector Control Section has conducted community rodent surveys since 1992. One hundred homes from each community were selected with four traps set per house for one week. Trapped rodents were tested for *Leptospira* and *R. typhi*. Kidney tissues were cultured for *Leptospira*. Blood was tested for *R. typhi* antibody using the IFA test. The typhus survey results for West Kaua'i are shown in the Table. Leptospirosis and sporadic typhus rodent infections were identified in southwest communities between 1992 and 1998. The survey found typhus-infected rodents in the towns of Kōloa, Kaumakani, and Waimea on the west side, and also in Līhu'e and Hanamā'ulu on the east side of the island.

The increased incidence of murine typhus cases on Kaua'i are not yet explained. Aggressive DOH, military, sugar and seed industry rodent control programs have been in operation for many years. Murine typhus cases may have gone unrecognized in the recent past. West Kaua'i is an agricultural area of sugar and seed corn. Incoming vessels or cargo have been blamed for importa-

tion of rodents. After hurricane 'Iniki in September of 1992, large numbers of military personnel and cargo, civilian communications equipment, and hurricane recovery supplies arrived at the military base in Kekaha that may have been accompanied by a large number of rodents.

Residential Rodent Surveys, West Kaua'i, Hawai'i, 1992-1998

Year	Town	Total Trapped	#Typhus positive	#Lepto positive
1992	Kekaha	32	0	2
1994	Kaumakani	31	2	3
1995	Kōloa	214	9	5
1996	Kalāheo	129	0	2
	Waimea	111	1	1
1997	Hanapēpē	134	0	1
1998	Lāwa'i	276	0	22
TOTAL		927	12	36

Murine typhus is rarely reported on O'ahu or the Big Island. However, typhus-infected rodents have been trapped on all the major Hawaiian Islands, including O'ahu and Hawai'i. Because of the presence of *R. typhi* in vector populations, there is a potential for murine typhus to occur anywhere in the State.

Most cases of murine typhus are severe enough to warrant hospitalization. Fever, chills, and headache are frequently present. A macular or less-likely a maculopapular rash develops on the trunk and the extremities two to six days after the onset of illness. The rash occurs in only 50% of patients. Myalgias, nausea, vomiting, anorexia, and malaise are common symptoms.

Murine typhus can occasionally present as pneumonitis, or subacute meningoencephalitis. Abdominal pain due to murine typhus can sometimes be severe and confused with a condition requiring surgical intervention. The serum hepatic transaminases are often moderately elevated suggesting viral hepatitis. Common hematologic abnormalities include mild thrombocytopenia, mild leukopenia and anemia. Hypoalbuminemia, hypocalcemia, and hyponatremia frequently occur.

continued on page 7

Murine Typhus on Kauai

continued from page 6

The clinical course of murine typhus is usually uncomplicated. Some patients have recovered spontaneously without specific therapy. Complications of murine typhus are infrequent, but include neuropsychiatric abnormalities, renal failure, jaundice, hepatic insufficiency, respiratory failure, and hematemesis. Ten percent of murine typhus cases have

been reported to require intensive care unit management, and the case-fatality rate has been reported to range from 1% to 4%.¹ A severe case of murine typhus with renal failure and elevated liver enzymes can easily be confused with leptospirosis, and both infections can be present concurrently.

Physicians should inquire about rodent, cat and flea exposure when evaluating patients with non-specific febrile illness-

es. When there is a suggestive exposure history for murine typhus, acute and convalescent sera for typhus IgM IFA titers should be obtained 2 weeks apart. The sera can be sent to a commercial laboratory for IFA typhus testing.

The treatment of choice for murine typhus is doxycycline 100 mg orally or intravenously every 12 hours, continued until two or three days after defervescence. Tetracycline, 25-50 mg/kg/day in four divided oral doses for the same duration of therapy, is also acceptable. Chloramphenicol is effective at 50-75 mg/kg/day in four divided oral doses for the same duration of therapy. Initiation of appropriate antibiotic therapy results in prompt clinical improvement and shortens the duration of fever. Relapses have been reported with chloramphenicol therapy. Because murine typhus can be severe or even fatal, appropriate specific therapy for murine typhus should begin promptly without waiting for serologic confirmation if clinical and epidemiologic clues raise suspicion for this diagnosis. The possibility of concurrent leptospirosis must also be considered.

Prevention is directed toward rodent and flea eradication programs. The Epidemiology Branch must be notified of all murine typhus cases. The DOH Vector Control staff is available for rodent trapping, testing and advice on eradication at exposure sites.

For more information on murine typhus, call the Kaua'i District Health Office at (808) 241-3563, and for rodent control, call (808) 241-3306.

REFERENCES.

- ¹ Dumler, J. S., Tayler, J.P., Walker, D.H., Clinical and Laboratory Features of Murine Typhus in South Texas, 1980 Through 1987. *JAMA* 1991; 266(10): 1365-1370.
- ² Benenson, A.S., Ed., Control of Communicable Diseases in Man, 16th Ed. *APHA*, 1995, Washington D.C.

Submitted by Jo Manea, B.S.N., G.C.P.H., Epidemiological Specialist, Kaua'i District Health Office.

Tuberculin Skin Testing

continued from page 2

- corticosteroids or other immuno-suppressive drugs;
- onset of TB infection within 10 weeks of the tuberculin skin test because it takes two to 10 weeks for the body's immune system to be able to react to the tuberculin after initial infection; and
- children younger than six to 12 months of age because their immune systems are not yet fully developed.

False-positive or false-negative reactions may occur when the tuberculin skin test is applied incorrectly or the results are not measured properly.

BCG Vaccination

Many immigrant children have had the BCG vaccine before coming to Hawai'i. Many (but not all) of these children come from countries with high incidence rates of TB, and must be screened with the tuberculin test. A child previously vaccinated with BCG who has a positive tuberculin skin test is assumed to have been infected with *Mycobacterium tuberculosis* and must receive a chest x-ray in order to obtain a TB clearance.

TB Clearance Certificate

Possession of a valid TB clearance certificate is proof of TB clearance. A valid TB clearance certificate can be issued either by the Department of Health (DOH), or may be provided by a physician or advanced practice registered nurse. The practitioner must sign a form approved by the department stating that they have

examined an individual on a particular date, and *found the person to be free of communicable TB*. The examination for TB shall consist of a tuberculin skin test, and if the test shows a positive reaction, a chest x-ray. The certificate must include the dates of administration and reading of the tuberculin test; the diameter of induration in millimeters; and the result, date, location, and name of the reader of the chest x-ray. The practitioner's certificate is simply the practitioner's business stationary or prescription pad that legibly contains the required information and is signed by the practitioner. There is no requirement for the practitioner to send their patient back to the health department to get another TB clearance certificate if the practitioner has completed such a form.

The *Student's Health Record (Form 14)* is also an acceptable form for TB clearance. This form has a section for recording the tuberculin skin test and chest x-ray results as required for TB clearance. The practitioner's stamp is acceptable on this form provided that the practitioner's authorized representative (usually the office nurse) initials the stamp mark.

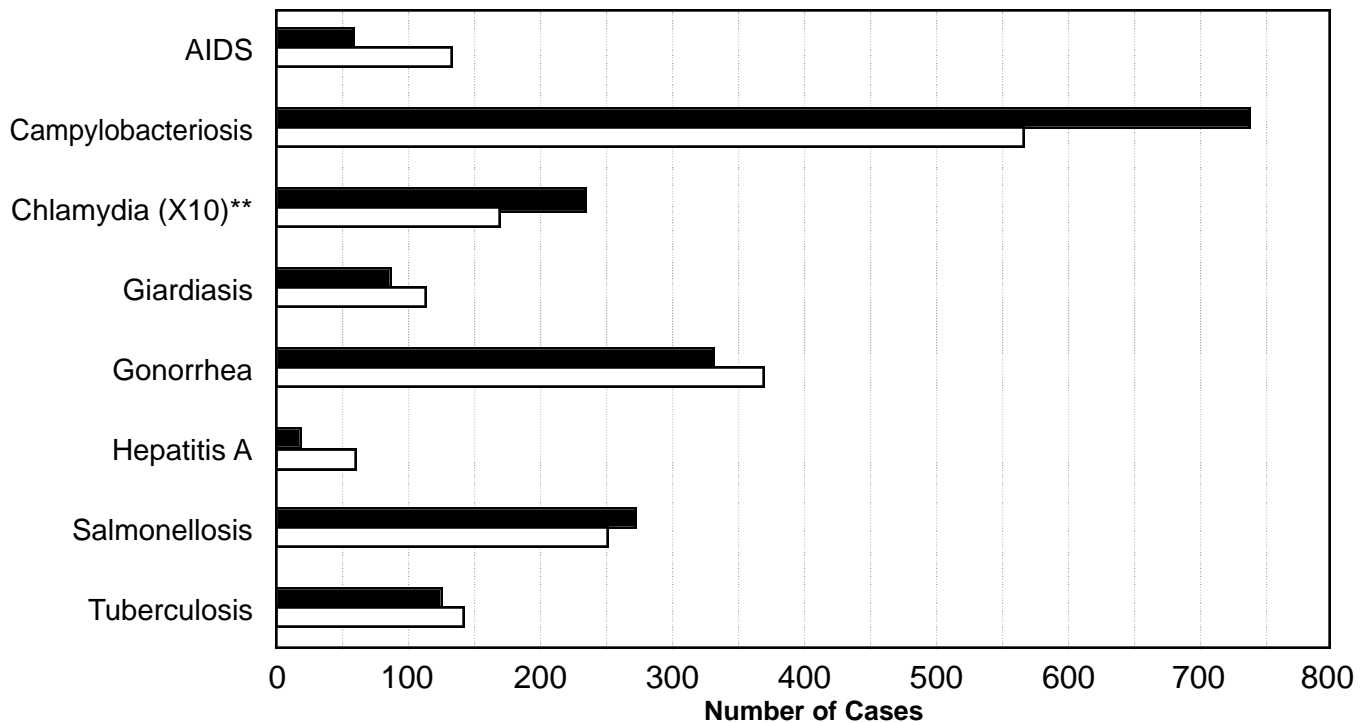
The DOH, TB Control Branch will provide training on skin testing techniques to registered nurses. For more information, please contact the TB Control Branch at 832-5731.

Submitted by James Gollop, M.D., M.P.H., Tuberculosis Physician, Tuberculosis Control Branch.

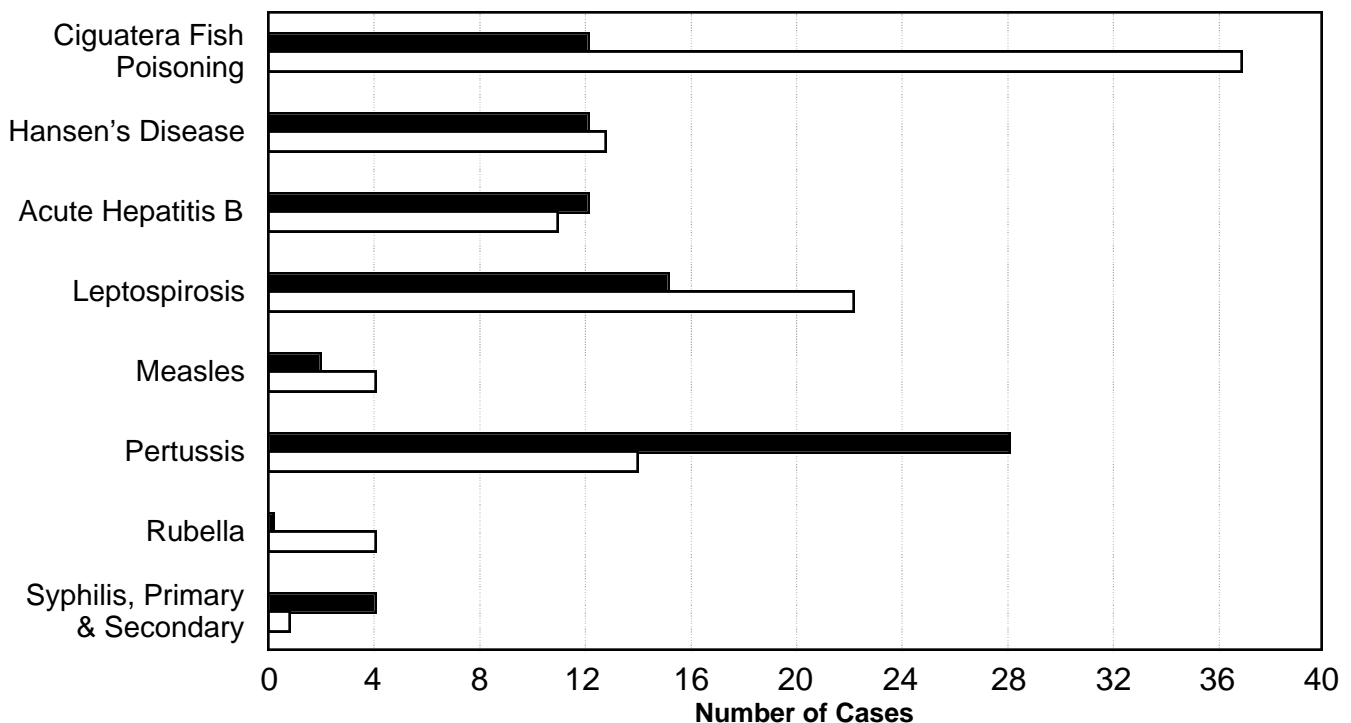
Communicable Disease Surveillance

Selected Diseases by Date of Report*

Hawai'i, 1999 Year-to-date Through September



■ 1999 YTD □ 5 YR Median YTD



* These data do not agree with tables using date of onset or date of diagnosis.

**The number of cases graphed represent 10% of the total number reported.

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Communicable Disease Report

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CONTENTS

- ◆ *Murine Typhus on Kaua'i: 1998*
- ◆ *Tuberculin Skin Testing in Hawai'i*
- ◆ *Diagnostic Tests For Hepatitis C Virus*
- ◆ *The Teenvax Project*
- ◆ *Revised Recommendations for Routine Poliomyelitis Vaccination*